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New species and new records of *Herpothallon* (lichenized *Ascomycota*) from India

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Abstract — *Herpothallon flavominutum* and *H. himalayanum*, two new lichenized ascomycetes, are described from India. *Herpothallon flavominutum* has a byssoid thallus with granular pseudoisidia and a white prothallus and hypothallus and contains lichexanthone, norlichexanthone, and psoromic acid whereas *H. himalayanum* has a byssoid thallus with irregularly cushion-shaped pseudoisidioid outgrowths and a whitish to lemon yellow hypothallus and contains gyrophoric and lecanoric acids. Three additional *Herpothallon* species, *H. albidum*, *H. cinereum* and *H. philippinum,* are reported as new records for India.

Key words — *Arthoniales*, *Arthoniaceae*, eastern India

Introduction

Herpothallon is a recently reinstated lichen genus in the family *Arthoniaceae* (Aptroot et al. 2009) and includes 29 species world-wide. The genus is characterized by the byssoid prothallus and hypothallus, ± felty heteromerous thallus with felty pseudoisidia, pustules, soredia-like granules, or minute granules, and *Trentepohlia* as photobiont. Following the above work, Jagadeesh Ram et al. (2009) reported two new species and two new records from India. In this paper we propose an additional two new species and report three new records of *Herpothallon* from eastern India. The new species are described below and brief notes on the new records are provided.

Materials and methods

Specimens collected from eastern India and deposited in BSA were investigated. External morphological features were observed with an Olympus SZ61 stereo microscope. Thin hand-cut sections of thalli were mounted in water, 10% KOH solution, Lugol's iodine solution and lactophenol cotton blue (LCB) and examined with a Leica DM 2500 compound microscope. The lichen substances were identified by thin layer chromatography (Orange et al. 2001) and high performance liquid chromatography (Elix et al. 2003).

The new species

Herpothallon flavominutum Jagadeesh, G.P. Sinha & Elix, **sp. nov.** Fig. 1

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Thallus corticola, epiphloeodes, byssoideus, griseo-luteus; pseudoisidia densa, granulares, 0.02–0.06 mm diam.; asci non visi; substantiae lichexanthone, norlichexanthone et psoromicum continens.

Holotype – INDIA, Sikkim, Gangtok, Baluwakhani, Botanical Survey of India, Sikkim Himalayan Circle campus, alt. c. 1700 m, on *Alnus nepalensis*, 24 November 2006, *G.P. Sinha 3743* (BSA).

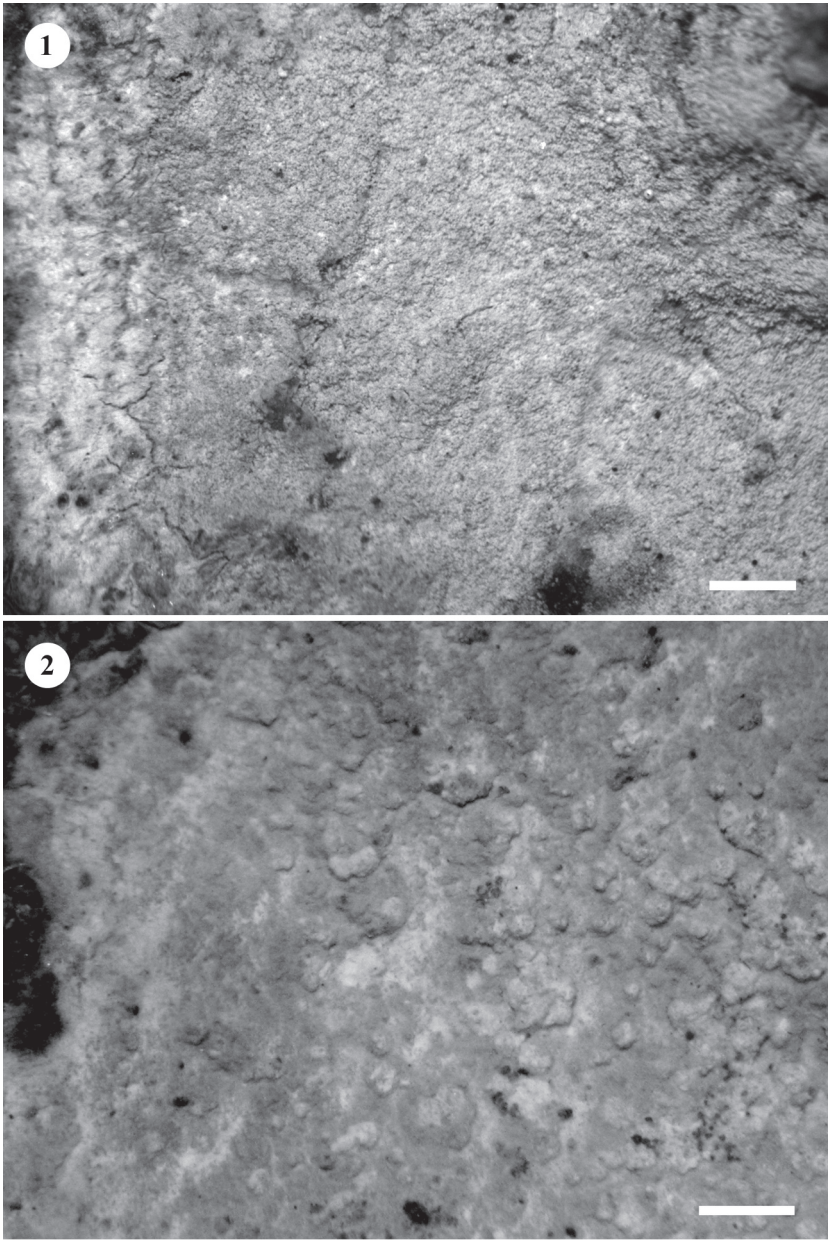
Etymology: the species epithet refers to the UV+ yellow thallus and the very small pseudoisidioid outgrowths.

Thallus corticolous, epiphloeodal, ± loosely adpressed, orbicular to suborbicular, 2–5 cm wide, greyish yellow, byssoid, not flaking off, felty, 100–160 µm thick, with calcium oxalate crystals; crystals few to many, 3–20 µm wide. Hypothallus below the entire thallus, byssoid, whitish, mainly of radiating loosely interwoven hyphae, hyphae 1.5–2.5 µm wide. Prothallus white, byssoid, mainly of radiating loosely interwoven hyphae, 1.5–2.5(–3) mm wide. Pseudoisidia numerous, dense, minute, felty with projecting hyphae, granular, globose, subglobose to ± cylindrical, 0.02–0.06 mm diam., or 0.03–0.08(–0.1) mm long, 0.02–0.06 mm wide. Photobiont *Trentepohlia*, in short, irregular threads, single to aggregated. Asci and pycnidia not seen.

Chemistry – Thallus K+ orange, C–, KC–, P–, UV+ yellow; I+, KI+ blue in patches (section). HPLC: lichexanthone (major), norlichexanthone (major) and psoromic acid (minor).

Paratype – INDIA, Meghalaya, Shillong, Laitumkhrah, Botanical Survey of India, Eastern Circle campus, near Orchidarium, alt. c. 1435 m, on *Acacia* sp., 14 February 2008, *T.A.M. Jagadeesh Ram 4154* (BSA).

Remarks – *Herpothallon flavominutum* is characterized by the byssoid thallus with granular pseudoisidia and the presence of lichexanthone, norlichexanthone, and psoromic acid. *Herpothallon adnatum* G. Thor, *H. brialmonticum* Aptroot & Elix 2009, *H. corallinum* G. Thor 2009, *H. granulare* (Sipman) Aptroot & Lücking 2009, and *H. hypoprotocetraricum* G. Thor 2009 are other species having somewhat similar pseudoisidia but differ in chemistry, prothallus, and hypothallus characters. *Herpothallon elegans* G. Thor 2009 is the only other species that contains lichexanthone as a major substance, but it is distinguished by having additionally constictic, stictic, and salazinic acids as well as a reddish brown prothallus and cylindrical pseudoisidia up to 0.5 × 0.1 mm (Aptroot et al. 2009). At present *H. flavominutum* is known from the Khasi hills (Shillong) and Sikkim in the Eastern Himalaya.



Figs. 1–2. 1. *Herpothallon flavominutum* (holotype). 2. *Herpothallon himalayanum* (holotype). Scale = 1 mm.

Herpothallon himalayanum Jagadeesh & G.P. Sinha, **sp. nov.** Fig. 2

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Thallus corticola, epiphloeodes, byssoideus, albo-griseus ad flavo-griseus; hypothallus albus ad flavus, byssoideus; pseudoisidia irregularis, usque ad 1 × 0.5 mm; asci non visi; acidum gyrophoricum, lobaricum et substantia ignota continens.

Holotype – INDIA, West Bengal, Darjeeling district, Neora Valley National Park, Neora riverine rainforest, N 27° 05' 49.2", E 88° 43' 29.7", alt. 2163 m, 16 May 2008, *T.A.M. Jagadeesh Ram 4310* (BSA).

Etymology: the species epithet refers to the geographical region of the type collection site (Eastern Himalaya).

Thallus crustose, corticolous to muscicolous, up to 5 cm wide, loosely appressed to the substrate, byssoid, firm to flaking off, dull, felty, pale yellow mineral grey to grey-green, with scattered red granules, verrucose to pustulate, up to 200 µm thick in section, hyphae 1.5–2.5 µm wide, with few to numerous calcium oxalate crystals; crystals scattered, 3–10 µm wide. Hypothallus below the entire thallus, byssoid, whitish to mostly lemon yellow, composed of 1.5–2.5 µm wide hyphae. Prothallus dirty white, composed of interwoven and radiating hyphae, up to 1.5 mm wide. Pseudoisidioid outgrowths numerous, scattered to closely aggregated, irregularly cushion-shaped, fluffy-felty with many projecting hyphae, paler than the thallus, up to 1 × 0.5 mm. Photobiont *Trentepohlia*, in short, irregular threads, single to aggregated. Asci not seen. Pycnidia hemispherical, dark brown to black, developing on the pseudoisidioid outgrowths, 0.05–0.07 mm diam.; Conidia not observed.

Chemistry – Thallus K–, C+ red, KC+ red, P–, UV–, I+ and KI+ blue; hypothallus in pigmented parts K+ blood-red. TLC: gyrophoric acid (major), lecanoric acid (minor) and an unidentified yellow pigment (major) are present.

Remarks – The thallus of *H. himalayanum* is characterized by irregularly cushion-shaped, pseudoisidioid outgrowths, a whitish to lemon yellow hypothallus, and the presence of gyrophoric and lecanoric acids. The pseudoisidioid outgrowths are often closely aggregated to give the appearance of a distinctly verrucose surface when old and have occasionally minute cylindrical to spherical pseudoisidioid outgrowths arising from the verrucose surface that often bear pycnidia. Externally *H. himalayanum* resembles *H. albidum,* which is distinguished by a different chemistry and blue-green hypothallus. *Herpothallon fertile* Aptroot & Lücking 2009, the other similar species with a lemon yellow hypothallus and similar chemistry, differs in having a fertile I– and KI– thallus and lacking pseudoisidia and calcium oxalate crystals (Aptroot et al. 2009).

New records

Herpothallon albidum (Fée) Aptroot, Lücking & G. Thor 2009

This pantropical species has been found in a montane riverine rainforest in the Eastern Himalaya. It is characterized by the loosely attached, byssoid thallus with scattered calcium oxalate crystals, a blue-green byssoid hypothallus, a whitish prothallus, irregularly cushion-shaped fluffy-felty pseudoisidia, and the presence of psoromic acid and pigmentosin D.

Specimen Examined – INDIA: West Bengal: Darjeeling district, Neora Valley National Park, Neora river bank, N 27° 06' 44.7", E 88° 43' 00.8", alt. 2260 m, 17 May 2008, *Jagadeesh Ram 4345* (BSA).

Herpothallon cinereum G. Thor 2009

This species, previously known from Venezuela, has been found at a single locality in the Eastern Himalaya where it grew on the dry bark of a pine tree. It is characterized by the loosely to firmly attached thallus with many calcium oxalate crystals, a whitish hypothallus and prothallus, cylindrical pseudoisidia up to 0.5 × 0.1 mm, and the presence of confluentic acid.

Specimen Examined – INDIA: West Bengal: Darjeeling district, Kalimpong, campus of the Divisional Forest Manager Office, alt. 1206 m, on dry bark of *Pinus*, 6 Mar. 2007, *Jagadeesh Ram 3882* (BSA).

Herpothallon philippinum (Vain.) Aptroot & Lücking 2009

This widely distributed pantropical species has been found in the Cachar hills of Assam in a Tea Garden. It is characterized by the loosely to firmly attached thallus with many calcium oxalate crystals, whitish hypothallus and prothallus, cylindrical pseudoisidia up to 1 × 0.1 mm, and the presence of gyrophoric acid.

Specimen Examined – INDIA: Assam: North Cachar Hills district, Borjalanga, Rosekandy Tea Estate, on shade tree, 15 Jan. 2005, *V.N. Singh 1813* (BSA).

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Literature cited

Aptroot A, Thor G, Lücking R, Elix JA, Chaves JL. 2009. The lichen genus *Herpothallon* reinstated. Bibliotheca Lichenologica 99: 19–66.

Elix JA, Giralt M, Wardlaw JH. 2003. New chloro-depsides from the lichen *Dimelaena radiata*. Bibliotheca Lichenologica 86: 1−7.

Jagadeesh Ram TAM, Sinha GP, Singh KP. 2009. New species and new records of *Cryptothecia* and *Herpothallon* (*Arthoniales*) from India. Lichenologist 41: 605–613.

Orange A, James PW, White FJ. 2001. Microchemical methods for the identification of lichens. British Lichen Society, UK.